Sun Java™ Workstation W1100z and W2100z Architecture

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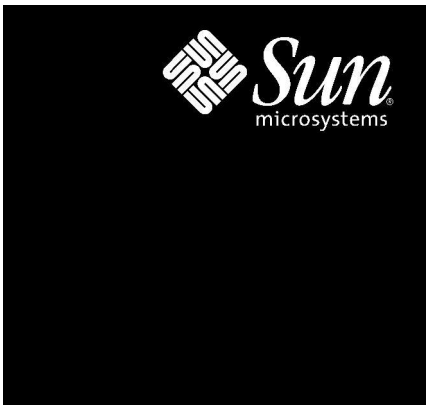

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Chapter 1
Introduction

“Simply the fastest workstations we’ve ever built...”

New Sun x86 AMD Opteron Processor-Based Workstation Product Family

Sun has recently introduced a new line of AMD Opteron processor x86-based workstations that demonstrate our
commitment to delivering the most compelling workstations on the market. With a single x86-based systems
architecture, the Sun Java™ Workstation W1100z and W2100z support both 32-bit and 64-bit operating systems
and applications, offering the highest degree of flexibility for customers who want to run existing 32-bit x86
operating systems and applications, and be able to gracefully migrate to the next-generation 64-bit operating
systems and applications when they are ready.

Figure 1-1. Both the Sun Java Workstation W1100z and W2100z ship in the same compact tower case packaging

The Sun Java Workstation W1100z and W2100z provide high performance with new 64-bit features and with existing 32-bit x86 applications. With support for multiple 32-bit and 64-bit operating systems, the Sun Java Workstation W1100z and W2100z offer the freedom customers need in order to run their choice of applications and industry-standard peripherals, yet minimize hardware support costs and reduce IT training costs. These facts, plus a one-year base warranty, and next-business-day support, mean that the Sun Java Workstation W1100z and W2100z offer among the best total cost of ownership (TCO) for workstations.

This document describes the system architecture for both the Sun Java Workstation W1100z and the Sun Java Workstation W2100z, along with key software components included with both models that enable a wide range of service deployments.

A Quick Note on the Nomenclature

The “W” in the Sun Java Workstation W1100z and W2100z is the same W used in “SunW”, our publicly traded
stock symbol. The first number of the series indicates the number of processors (1 or 2). The remaining digits may
evolve meaning over time, but have been left the same for now.

Target Users and Markets

The Sun Java Workstation W1100z and W2100z are designed to provide optimal performance, reliability, and scalability for the widest range of users and markets in Sun history. With these new workstations, Sun seeks to slake the never-ending thirst for performance from our traditional customers and provide an attractive platform for new customers to adopt and exploit.

Sun Java™ Workstation W1100z

The entry-level, single-processor Sun Java Workstation W1100z is ideal for the following users and markets:
• Consumer Electronics
• General and Higher Education (e.g., classrooms, labs, research, K-12)
• Government (e.g., security, federal government, mission planning, defense)
• Telco (e.g., NOCs, TOCs, call centers)
• Semiconductor manufacturers (e.g., chip manufacturing, ASIC simulations)
• Motherboard manufacturers (e.g., board layout tools, etc.)
• PCB manufacturers
• Automobile
• Aerospace
• Heavy machinery
• OEMs (e.g., medical, air traffic control, military)

Sun Java™ Workstation W2100z

The dual-processor Sun Java Workstation W2100z is recommended for the following power-hungry and demanding users and markets:
• Energy (e.g., Oil and Gas, research/exploration/data mining)
• Government (e.g., GIS/mapping, 3-D visualization, security, HPC)
• Higher Education (e.g., classrooms, research labs, university-level software development courses)
• Life Sciences (e.g., medical imaging, genomics, Nano BioTech)
• Manufacturing, including Electronic Design Automation (EDA), Mechanical Computer Aided Design (MCAD), and
MCAE (Mechanical Computer Aided Engineering)
• Financial modeling and economic simulation
• OEMs (e.g., medical, air traffic control, military)

Chapter 2

Sun Java Workstation W1100z and W2100z System Overview

The Sun Java Workstation W1100z and W2100z have been designed for high-performance, scalability, and flexibility at a cost-effective price in a common deskside tower enclosure. They feature 64-bit performance, large memory support, I/O capability to support low-latency, high-bandwidth interconnects for technical computing, 32-bit x86 compatibility, multiple OS support, and a wide range of peripheral and ISV support. Customers can run their current 32-bit applications and leverage their existing knowledge base while laying a foundation that can take advantage of future benefits of next-generation 64-bit operating systems and applications

The Sun Java Workstation W1100z and W2100z are solidly built to Sun-renowned quality specifications and come from the factory with a robust set of desktop workstation features, including:
• Support for single or dual AMD Opteron processors with AMD HyperTransport technology and an integrated
dual-channel memory controller, enabling true 64-bit computing on an x86 architecture. (HyperTransport
technology delivers exceptional bandwidth, alleviating the constraints that typically limit performance with
off-chip memory controllers.)
• High bandwidth memory subsystem with error correction
• Support for up to an industry-leading 16 GB of total system memory in a mini-tower workstation (upon availability of 2 GB DIMMs)
• Visualization-class AGP graphics accelerators
• A mini-tower form factor featuring five USB 2.0 ports, two IEEE 1394a (FireWire) ports, one built-in copper
Gigabit Ethernet port (CAT6 recommended), and Ultra320 SCSI interfaces
• Five high-speed PCI-X expansion slots that enable high-speed system interconnect, such as external Ultra320
SCSI, additional Gigabit Ethernet adapters, etc.
• Expandable, high-performance storage options
• Choice of operating systems

Feature Comparison

Table 1-1 describes the main features, functions, and benefits offered by the Sun Java Workstation W1100z and W2100z.

Table 1-1: Sun Java Workstation W1100z and W2100z Features Comparison

	Sun Java Workstation W1100z	**Sun Java Workstation W2100z**
Processor Type	One AMD Opteron 100-series CPU	Two AMD Opteron 200-series CPUs
Processor Speed	1.8 GHz (Model 144) to 2.4 GHz (Model 150)	1.8 GHz (Model 244) to 2.6 GHz (Model 252)
Memory	Up to 8 GB of PC3200 Registered ECC Memory Note: 4 GB currently available. 8 GB will utilize 2 GB DIMMs, which will be available in August 2004	Up to 16 GB of PC3200 Registered ECC Memory Note: 8 GB available at RR only. 16 GB will utilize 2 GB DIMMs, which will be available in August 2004.
Graphics	NVIDIA Quadro NVS280, FX500, , FX3000, FX4000	
Networking	Gigabit Ethernet	
Optical Drives	DVD-ROM/CD-RW Standard (DVD +/- R/RW Optional)	
Hard Disk Drive	Up to 160 GB (2x 80 GB) of UltraATA-100	Up to 584 GB (4 x 146 GB) of Ultra320 SCSI
USB 2.0	Five ports	
FireWire	Two ports	
Audio	AC '97	
Parallel/Serial	One parallel (D-25 pin)/Two serial (DB-9-M)	
Height	462 mm (18.2 inches)	
Width	200 mm (7.9 inches)	
Depth	557 mm (21.9 inches)	
Weight	24 kg (53 lbs)	
Legacy I/O	Floppy and PS2 keyboard/mouse not supported	

External View of the Sun Java Workstation W1100z and W2100z

Front View

Figure 2-1 shows the front view of the Sun Java Workstation W1100z/W2100z. The CD-RW/DVD-ROM always occupies the first external drive bay. The hard disk drive LED shows the activity of the 73-GB Ultra320 SCSI HDD (Sun Java Workstation W2100z only) or the 80-GB UltraATA HDD (Sun Java Workstation W1100z only).

The system fault LED functionality will evolve over time. For the first release of the Sun Java Workstation W1100z/W2100z, the System Fault LED will light up on any BIOS hardware error, including memory errors, POST errors (h/w), and machine check exceptions. Future releases of the Sun Java Workstation W1100z/W2100z will support CPU overheating, fan speed failure, and other errors. The LED in the front panel provides only limited information. The PC Check diagnostic utility included with the Sun Java Workstation W1100z/W2100z should be used to gain detailed information about the system.

NOTE: The system fault LED will not be functional at the time of revenue release.

Leveraging the more recent advances in industry-standard peripheral interfaces, the Sun Java Workstation W1100z/W2100z provides convenient expansion to external portable hard drives or digital cameras via two USB 2.0 connectors and one IEEE 1394a (FireWire) connector. Additionally, an input for a microphone and a line-level output for headphones are also included. Additional USB, FireWire, and audio ports can be found on the rear panel.

Figure 2-1: Sun Java Workstation W1100z/W2100z—Front View

Rear View

Figure 2-2 shows the rear view of the Sun Java Workstation W1100z/W2100z. It contains the remaining USB ports,
one IEEE 1394a (FireWire) port, and audio ports. Starting from the top of the chassis, the Sun Java Workstation
W1100z/W2100z provides a parallel port and two serial ports. Next, two USB 2.0 ports and the remaining IEEE
1394a port are located together. The final USB 2.0 port and the RJ-45 Gigabit Ethernet connector are next, followed
by the remaining audio connectors (audio out, audio in, microphone in).

Category 6, Universal Twisted Pair (CAT6-UTP) network cabling is recommended for optimal performance, but is not required for general network connectivity.

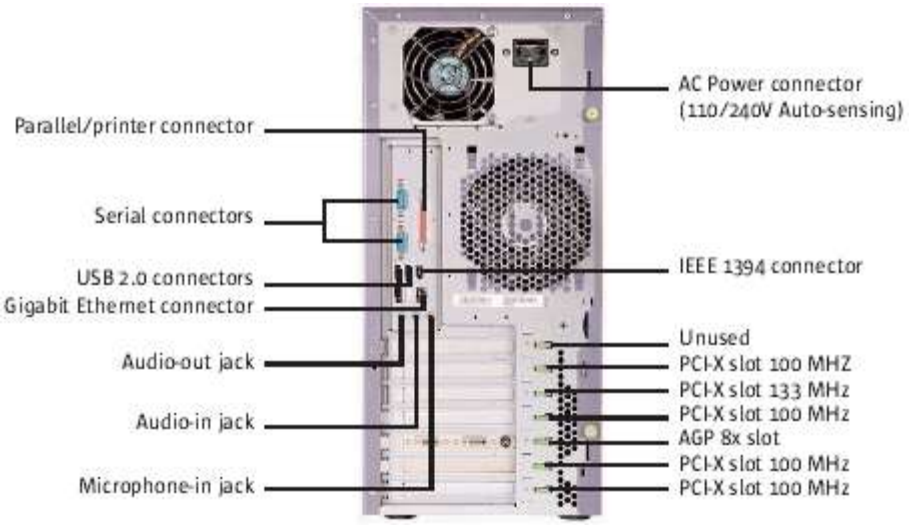

Figure 2-2: Sun Java Workstation W1100z/W2100z—Rear View

Chapter 3

Sun Java Workstation W1100z and W2100z System Architecture

This chapter describes the Sun Java Workstation W1100z and W2100z architectures in detail, including the
motherboards and processors, memory subsystem, interconnects and ASICs, storage, and system I/O.

Motherboard

The heart of the new Sun Java Workstation W1100z and W2100z is the motherboard. Both workstations are based
on a common motherboard that utilizes a two-piece construction. The main board provides the majority of the
functionality common to all systems. Meanwhile, the expansion card provides one Advanced Graphics Port (AGP)
and three full-length PCI-X slots. The two-processor Sun Java Workstation W2100z has an additional processor and
memory daughter card that provides multi-processing capability.

Figure 3-1 illustrates the motherboard for both the Sun Java Workstation W1100z and the Sun Java Workstation W2100z in a basic block diagram that represents the actual physical board layout of the CPUs, ASICs, sockets, interfaces, and connectors.

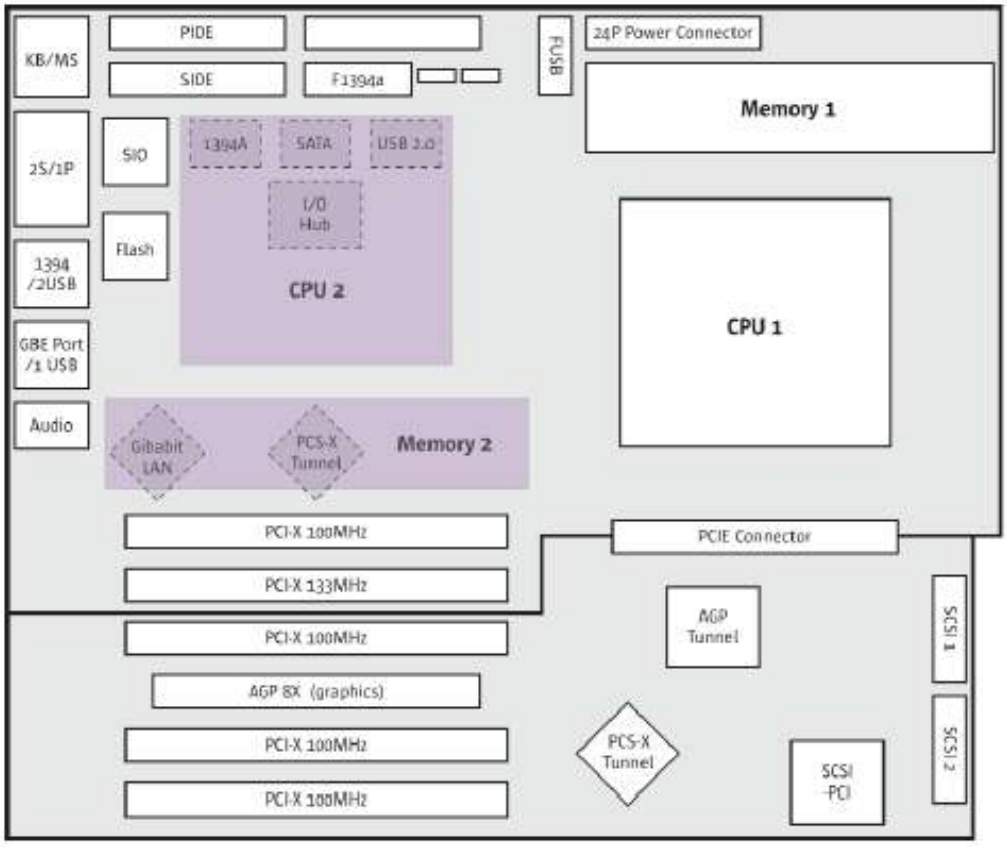

Figure 3-1. Physical layout block diagram of the Sun Java Workstation W1100z and W2100z motherboard

Figures 3-2 and 3-3 illustrate in detail the fully-integrated system motherboard that is the basis for both the Sun Java Workstation W1100z and W2100z. Figure 3-2 shows the actual, single-processor Sun Java Workstation W1100z motherboard and Figure 3-3 shows the actual, dual-processor Sun Java Workstation W2100z motherboard.

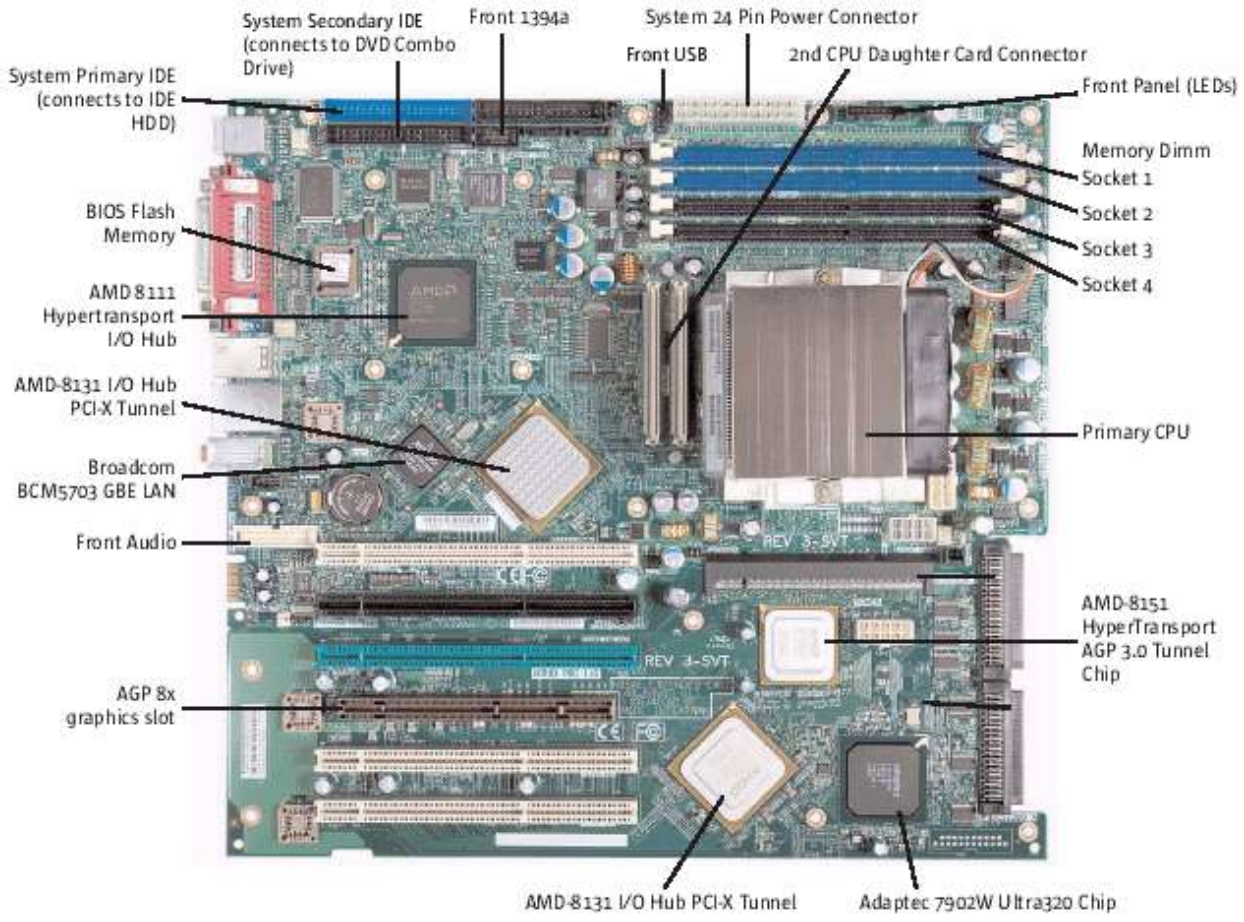

Figure 3-2. Sun Java Workstation W1100z motherboard

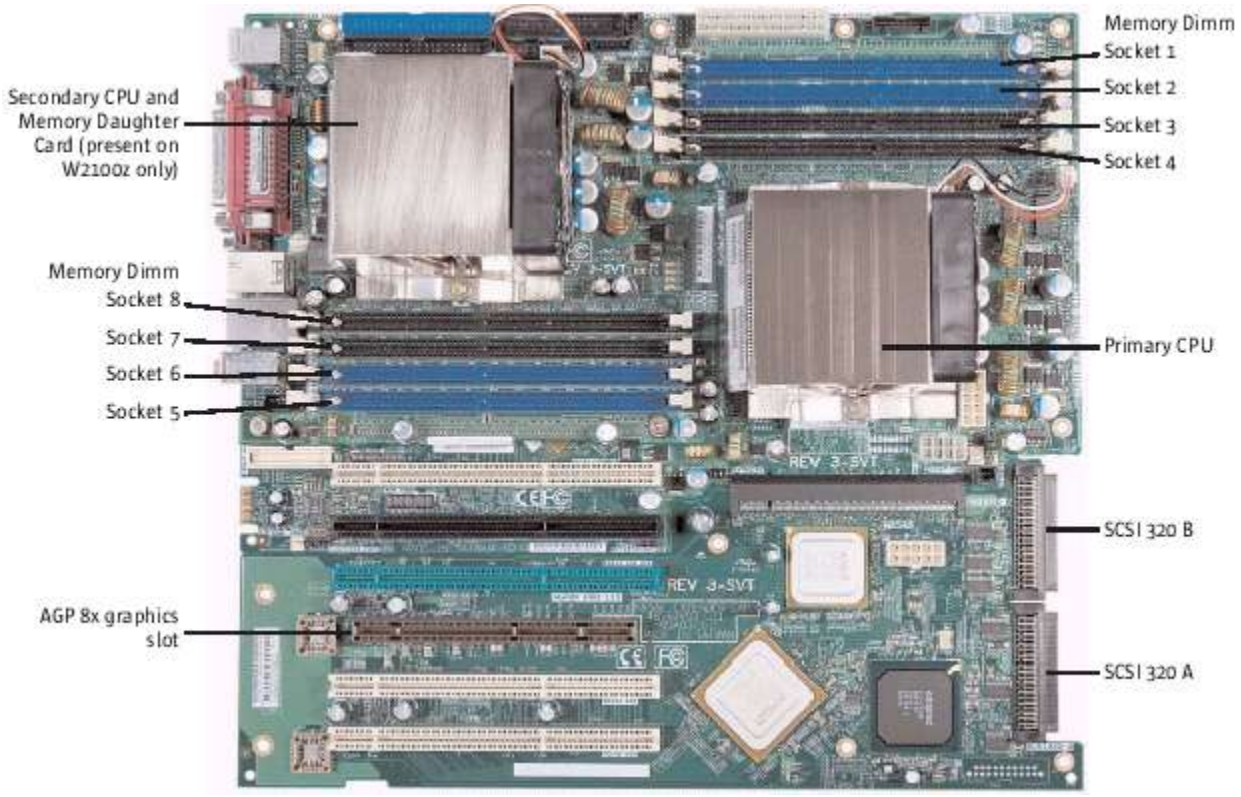

Figure 3-3. Sun Java Workstation W2100z motherboard

Figure 3-4 illustrates the modularity of the Sun Java Workstation W1100z and W2100z system motherboard and shows how the hardware expansion module (K85AE E-card) connects to the main, core motherboard (K85AE Main board). The K85AE expansion module provides the AGP 8x slot and 3 full-length PCI-X slots (among other things) needed to complete the entire system motherboard for the Sun Java Workstation W1100z and W2100z. The K85AE expansion module can be used to implement new features, such as PCI Express.

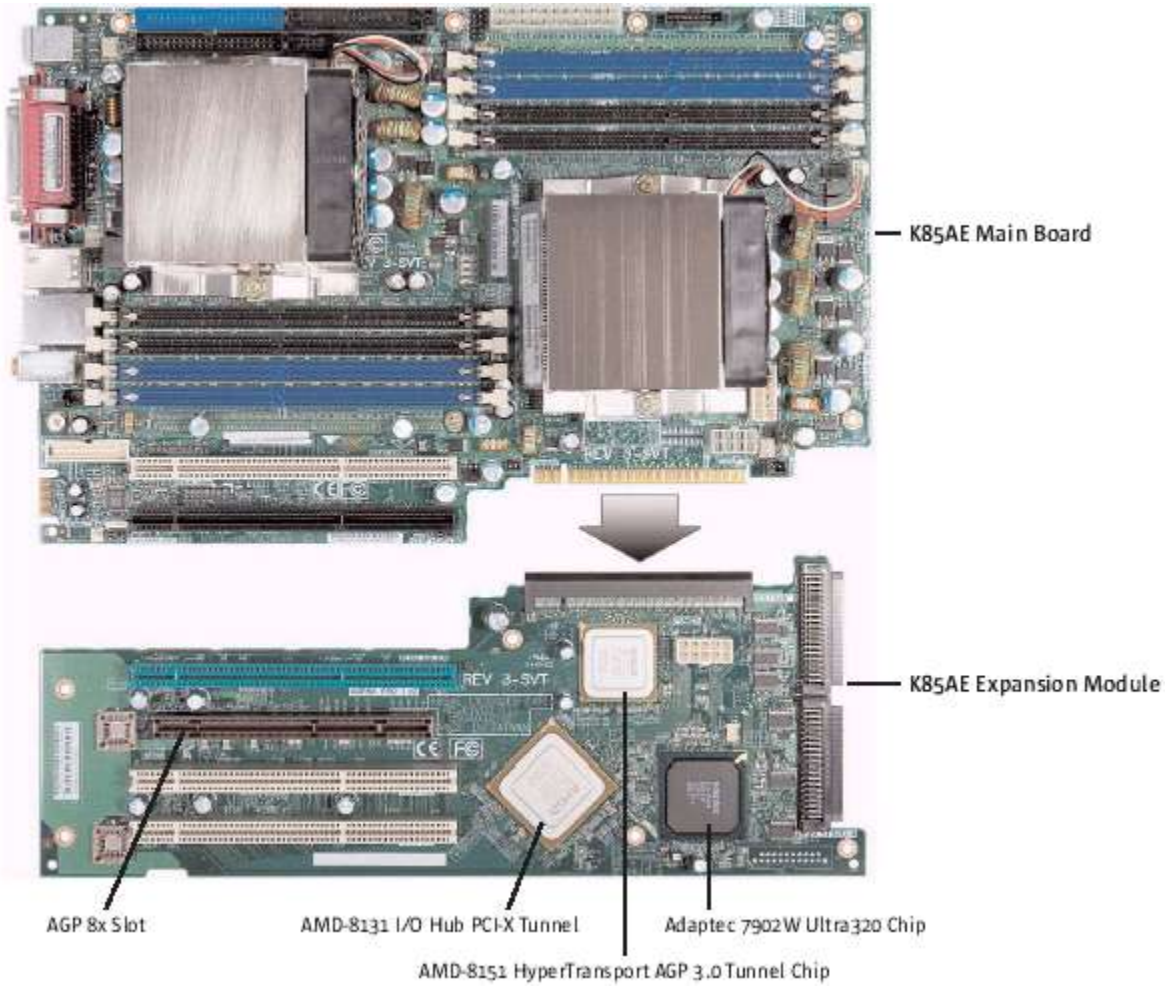
K85AE Main Board
K85AE Expansion Module
AGP 8x Slot
AMD-8131 I/O Hub PCI-X Tunnel
Adaptec 7902W Ultra320 Chip
AMD-8151 HyperTransport AGP 3.0 Tunnel Chip

Figure 3-4. Main board and expansion module

AMD Opteron Processor

The Sun Java Workstation W1100z supports one AMD Opteron 100 Series processor while the Sun Java Workstation W2100z supports up to two AMD Opteron 200 Series processors. Each processor contains a memory controller supporting a 128-bit wide path to memory and three 16x16-bit HyperTransport links. Each HyperTransport link runs at up to 800 MHz and is clocked on both edges of the clock pulse, allowing for a maximum of 3.2 GB/sec. (1.6 GB/sec., 2 bytes wide) throughput in each direction (6.4 GB/sec. aggregate data rate bi-directionally).

The following AMD Opteron processors are available:
• 1.8 GHz (Model 144/244)
• 2.0 GHz (Model 146/246)
• 2.2 GHz (Model 148/248)
• 2.4 GHz (Model 150/250)
• 2.6 GHz (Model 252 only)

Features of the AMD Opteron processor include:
• AMD64 architecture (64-bit extensions), integrated memory controller, and HyperTransport Technology
• Native support for the 32-bit x86 ISA, MMX, and 3DNow!
• ECC protection for L1 data cache, L2 unified cache, and DRAM
• HyperTransport links supporting up to 6.4 GB/sec. of direct inter-processor bandwidth and up to 6.4 GB/sec. Of bandwidth to PCI-X and AGP 8x
• CPU L1 Instruction cache: 64KB 2-way associative, parity protected
• CPU L1 Data cache: 64KB 2-way associative, ECC protected
• CPU L2 cache: 1MB 16-way associative, ECC protected

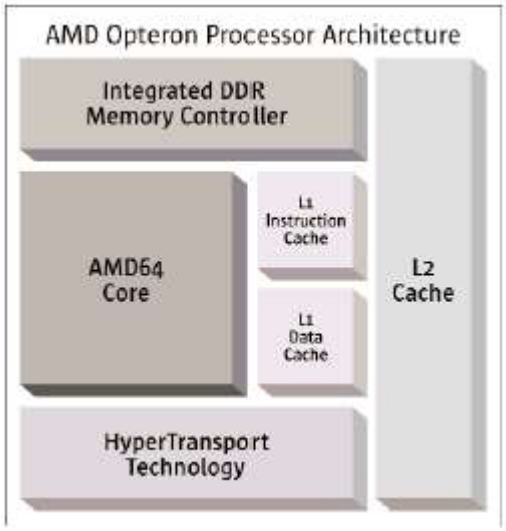

Figure 3-5 AMD Opteron processor block diagram

NOTE: In a single-processor Sun Java Workstation W1100z, the CPU must be in socket 0. In a dual-processor Sun Java Workstation W2100z configuration, the CPUs must be the same.

CPU Packaging

AMD Opteron processor packaging specifications include:
• 940-pin ceramic microPGA package
• 1.27 mm pin pitch
• 31 x 31 row pin array
• 40 mm x 40 mm ceramic substrate, C4 die attachment
• 16.5 mm x 11.3 mm die size

Processor VRM

Each CPU receives core voltage from an individual voltage regulator module (VRM). The VRMs regulate the bulk 12 Volt supply to the value required by the CPU core, as specified by the VID code output by the CPU package. The processor VRM is integral to and physically located adjacent to the memory sub-system.

Memory Architecture

Each CPU device includes an integrated memory controller. Up to four memory DIMM modules are supported per CPU. Access by one CPU to the memory residing on the other CPU incurs some latency as data must be forwarded through the interconnecting HyperTransport link. The AMD Opteron memory controller operates as a dual channel controller and can be configured to be 8 or 16 bytes wide. The controller supports 1 bit per byte ECC, and supports DDR400 (PC3200) registered DDR SDRAM modules.

Other features of the Sun Java Workstation W1100z and W2100z memory architecture include:
• Dedicated on-die 128-bit wide DDR memory controller
• Memory bandwidth of up to 6.4 GB/sec. per processor (with PC3200 modules)
• Under 80 ns latency
• Registered ECC DDR1-400 SDRAM support
• Up to 16 GB (8 GB per CPU) in 8 DIMM slots (4 slots per CPU)
• 512 MB to 2 GB DIMMs support
• Single supply (2.50 VDC)
• Standard SPD (VCC-SPD = 3.3V)

AMD64 Architecture

The AMD64 architecture allows end users to run existing 32-bit applications and operating systems at peak performance, while providing a migration path that is 64-bit capable. It is designed to enable 64-bit computing while remaining compatible with the vast x86 software infrastructure. The AMD64 Instruction Set Architecture (ISA) extends the existing x86 ISA and natively executes 32-bit code with no “emulation mode” to degrade performance. For 32-bit software that does not require immediate 64-bit implementations, AMD64 processorbased systems are designed to provide full application performance while continuing to improve with AMD64 platform performance enhancements.

Many applications encounter architectural barriers that prevent efficient performance scaling. The AMD64 ISA is designed to allow continued performance scaling for applications that demand multiprocessor scalability, larger addressable memory, better multimedia performance, or improvements in computational accuracy.

The kind of applications most likely to benefit from the AMD64 ISA include those that:
• Need large memory addressing to handle datasets larger then 3 GB (financial, scientific, and engineering modeling applications commonly deal with datasets much larger than 4 GB)
• Must manage a large number of concurrent users or application threads, such as large-scale, thin-client solutions, large databases, and data warehouse applications for solutions in customer relationship
management (CRM), supply chain management (SCM), enterprise resource planning (ERP), and digital rights management (DRM) systems

• Require real-time encryption and decryption for enhanced security, including e-commerce and protection of private or classified data
• Require high-precision mathematical precision and floating-point performance, including modeling, simulation, statistics and financial analysis, imaging/video/signal processing, physics, medical research, telecommunications, encryption, and compression
• Require large, high-power database performance, including decision support, searching and indexing, document and content management, and voice recognition
• Require x86 compatibility or the economies of scale of x86 as well as the large memory addressing capabilities
of 64-bit computing, including many high-performance computing (HPC) cluster applications
• Provide digital content creation capabilities such as computer-aided design (CAD), computer-aided manufacturing (CAM), and computer-aided engineering (CAE), digital music production and video editing, and
real-time media streaming solutions
• Require maximum performance for realistic and cinematic consumer experiences, including computer games,
digital video, and real-time collaboration
• Are able to migrate capabilities previously available only on 64-bit workstations to the business, consumer, and
hobbyist desktop, including 3D modeling, rendering, animation, simulation, and software development

The evolution of microprocessor architectures has played a fundamental role in increasing the capabilities and usefulness of computers. AMD64 processors are designed to maintain full compatibility with x86 while providing the architectural enhancements that provide world-class 64-bit performance. With the AMD64 ISA, relevant instructions and encodings have evolved to support 64-bits, increasing the resources available to hardware and software.

Major enhancements over legacy x86 include:
• Sixteen 64-bit general-purpose integer registers that quadruple the general purpose register space available to applications and device drivers as compared to x86 systems
• Sixteen 128-bit XMM registers for enhanced multimedia performance to double the register space of any current SSE/SSE2 implementation
• A full 64-bit virtual address space with 52 bits of physical memory addressing that can support systems with up to 4 petabytes of physical memory 65,535 times the amount of RAM supported by 32-bit x86 systems
• 64-bit operating systems to provide full, transparent, and simultaneous 32-bit and 64-bit platform application multitasking

AMD64 processors include HyperTransport Technology and are designed for flexibility and scalability. HyperTransport Technology provides links-based multiprocessing, simplifying the design of multiprocessor workstations and servers. Compatibility with x86 makes the AMD64 computing platform the first 64-bit platform designed to be compatible with mainstream PC applications while offering world-class performance, making it suitable for solutions ranging from consumer client PCs to high-performance clusters. The combination of flexibility and scalability directly addresses the broad range of capability and performance requirements IT professionals face today.

HyperTransport Technology

HyperTransport Technology is a high-speed, high-performance, point-to-point link for integrated circuits.

At a peak throughput of up to 6.4 GB/sec. bi-directional per link, HyperTransport Technology provides an I/O solution for the most demanding system applications. The AMD Opteron processor with built-in HyperTransport Technology links provides a scalable bandwidth interconnect between processors, I/O subsystems, and other chipsets. Sun Microsystems was a founding member of the HyperTransport Technology consortium.

System Performance Enhancements

HyperTransport Technology is designed to increase overall system performance by helping to remove I/O bottlenecks, which improves bandwidth and reduces latency.

Memory Interface

In traditional NorthBridge/SouthBridge architectures, memory transactions must traverse the NorthBridge element, creating additional latencies that reduce performance potential. To help resolve this performance bottleneck, AMD incorporates the memory controller into its AMD64 processors. The direct interface to the memory significantly reduces the memory latency seen by the processor. This latency will continue to drop as the processor frequency scales.

Additionally, hardware and software memory pre-fetching mechanisms can further reduce the effective memory latency seen by the processor. This reduction in memory latency, coupled with the additional increase in memory bandwidth available directly to the processor (resulting from this platform architecture design optimization), is critical as it greatly enhances system performance across all application segments.

Chip-to-Chip Interconnect

Current existing interface schemes offer throughput performance on the order of 266 MB/sec. to 1 GB/sec. Although these rates may be sufficient for desktop platforms, workstation, server, and other future platforms require a more robust interface. The simultaneous integration of high-speed technologies (such as AGP-8X, Gigabit Ethernet, PCI-X, and the InfiniBand Architecture) onto high-end platforms will quickly dwarf the bandwidth capabilities of existing interfaces.

HyperTransport Technology provides a high-speed, chip-to-chip interconnect that virtually eliminates the I/O performance bottleneck while providing ample performance headroom for future growth.

I/O Expansion Capability to High-Speed Industry Buses

The traditional NorthBridge/SouthBridge architecture is not intended to support more than two “core-logic” elements. Adding additional high-speed functionality (such as Gigabit Ethernet, PCI-X, the InfiniBand Architecture, or any combination thereof) would have to occur in one of three ways:

• The functionality would have to be attached to an existing bus interface such as the PCI bus. However, an existing bus may not have sufficient bandwidth to support high-speed technologies, especially in instances in which multiple buses or combinations of buses must be supported simultaneously.

• The functionality would have to be directly attached to the higher-speed, proprietary, chip-to-chip interconnect bus via a bridging device. However, the proprietary nature of this solution may limit the number of components available from vendors, thus impacting cost and availability.

• The functionality would have to be integrated into one of the core logic components. This solution is the least flexible, as a wide range of components would have to be created for each desired combination of feature-set buses.

HyperTransport Technology, an industry standard, provides system designers a high-speed, daisy-chained interconnect between system components. Specific components can be connected in a building-block fashion to achieve a platform with specific feature-set and performance objectives. Figure 3-7 shows a sample HyperTransport technology architecture block diagram.

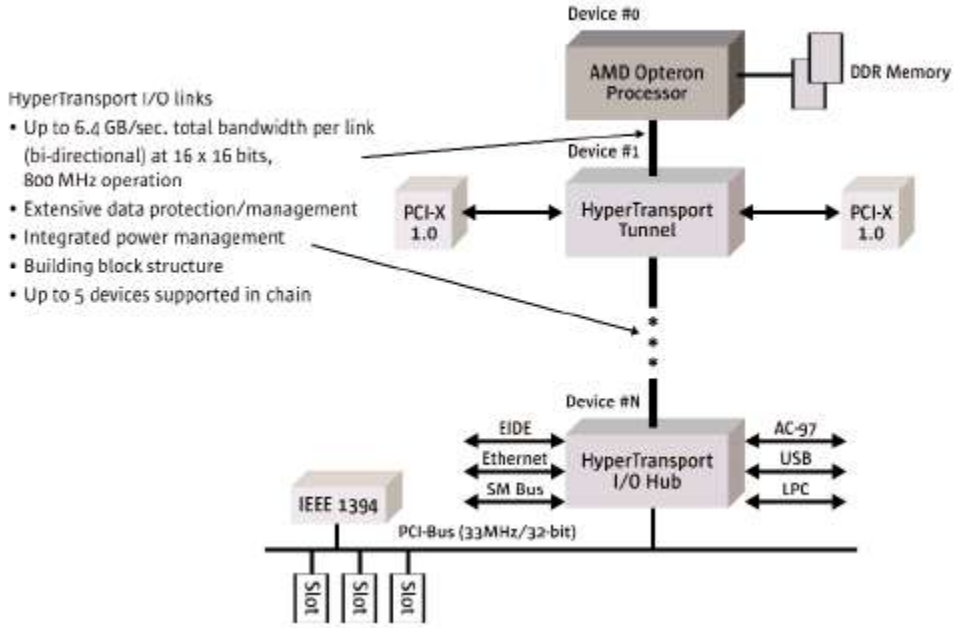

Figure 3-7. Sample HyperTransport Technology architecture block diagram

I/O Subsystem

The I/O subsystem is connected to the CPU complex through a HyperTransport link from the boot processor. The I/O subsystem consists of the following components:

- A tunneling HyperTransport bridge (AMD-8131 HyperTransport PCI-X Tunnel)
- A HyperTransport-attached AMD-8151 AGP 3.0 Tunneling bridge
- A HyperTransport-attached “SouthBridge” component (AMD-8111 HyperTransport I/O Hub)
- Flash memory for BIOS
- Additional peripheral I/O embedded on the planar consisting of:
    - A dual channel SCSI controller (type Adaptec 7902W) attached to the PCI-X Bridge AMD-8131
    - One 10/100/1000 (Gigabit) Ethernet MAC/PHY device (type Broadcom BCM5703)
    - A video/graphics slot(type AGP 3.0 (AGP-8x)) attached to the AMD-8151 AGP Tunnel bridge component
    - AC’97 Audio
    - USB 1.1 (upgraded to USB 2.0 on Sun Java Workstation W1100z and W2100z)
    - I/O buses: PCI, LPC, SMbus, and APIC

BIOS (Basic Input Output System) Flash Memory

The Sun Java Workstation W1100z and W2100z BIOS contains software that initially boots, initializes, and configures the workstations. The BIOS will initialize components, detect CPUs, check and test physical memory, configure onboard devices, configure PCI devices, and support and optimize any other functionality on the motherboard before passing control to the boot device. The BIOS contains Phoenix BIOS 4.0 Release 6.0 and the Server BIOS features that include:

- Quiet Boot

- ACPI 1.0b/2.0 support
- Wake on LAN
- Multi-boot support
- PXE (Preboot Execution Environment) support
- Wired for Management (WfM) 2.0 support
- Simple Boot Flag support (Quick-Boot)
- System Summary Screen
- ROM-based setup
- Mixed memory speed support
- Boot block function support
- Clear CMOS

The Sun Java Workstation W1100z/W2100z come from Sun with the BIOS already updated with a current released version of the software. Current versions, and future updates to the BIOS, which is included on the Sun Java Workstation W1100z/W2100z Supplemental CD, will be made available for download via http://www.sun.com/w1100z/downloads.html.

AMD-8000 Series Chipset

The AMD-8000series chipset is designed to support the AMD Opteron processor. Implementing HyperTransport technology as the system backbone, these core-logic elements deliver outstanding performance and design flexibility. This chipset consists of several building-block components that can be used together in a variety of system designs.

The AMD-8151 HyperTransport AGP 3.0 Tunnel

The AMD-8151HyperTransport AGP 3.0 Tunnel component provides AGP 3.0 capability to the Sun Java Workstation W1100z and W2100z. AGP, or Advanced Graphics Port, is a 2 GB/sec interface with intelligent memory management dedicated strictly to graphics. AGP enables the Sun Java Workstation W1100z and W2100z to offer high-performance, off-the-shelf graphics accelerators. Included in the AMD-8151™ chipset component are the following high-level features:

- AGP 3.0 (AGP-8x) interface
- HyperTransport tunnel

AMD-8131 HyperTransport PCI-X Tunnel

The AMD-8131HyperTransport PCI-X Tunnel provides high-speed PCI-X capability and offers the following feature-set:

- Dual PCI-X 1.0 interface (supporting 133MHz, 100Mhz, 66MHz, and Legacy-PCI speeds)
- HyperTransport tunnel
- APIC

The AMD-8131 is a tunneling HyperTransport device, which provides two PCI-X ports. It supports a 16-bit 800-MHz upstream bi-directional HyperTransport link and an 8-bit 800-MHz downstream bi-directional HyperTransport link. Each link supports independent transfer rates and bit width selection. The part supports the HyperTransport link disconnect protocol. The PCI-X bridges in AMD-8131 each support 64-bit addressing and a 64-bit data bus, with transfers at 66, 100, and 133 MHz in PCI-X mode and 33 and 66 MHz in conventional PCI 2.2 mode. Each bridge is independent and supports up to five PCI bus masters with clock, request, and grant signals. Each bridge also includes an IOAPIC that also

supports legacy interrupt modes.

AMD-8111 HyperTransport I/O Hub (SouthBridge)

The AMD-8111HyperTransport I/O Hub integrates the system I/O functions into a single component. The AMD-8111 HyperTransport I/O Hub feature set includes the following:

- HyperTransport interface
- 10/100 Ethernet (upgraded to Gigabit Ethernet on the Sun Java Workstation W1100z and W2100z)
- EIDE Controller, supporting up to ATA-100
- AC'97 Audio
- USB 1.1 (upgraded to USB 2.0 on Sun Java Workstation W1100z and W2100z)
- I/O buses: PCI, LPC, SMbus, and APIC

The AMD-8111 is a HyperTransport-attached SouthBridge function that provides several I/O blocks supporting basic peripherals and support functions for the system. AMD-8111 provides an 8-bit 200-MHz incoming HyperTransport bus and a 33-MHz LPC bus for connection to ROM and legacy I/O functions.

Memory

The AMD Opteron processor incorporates an integrated memory controller and improves the way typical x86 processors access main memory, resulting in increased bandwidth, reduced memory latencies, and increased processor performance.

The Sun Java Workstation W1100z can reach up to a maximum of 8 GB and supports industry-standard registered ECC PC3200 DIMMs. The Sun Java Workstation W1100z includes a 128-bit wide integrated DDR DRAM memory controller that delivers memory bandwidth on the order of 6.4 GB/s and supports up to four registered DDR DIMMs.

The Sun Java Workstation W2100z has two 128-bit wide, integrated DDR DRAM memory controllers that are capable of delivering memory bandwidth on the order of 12.8 GB/s and supports up to eight registered DDR DIMMs. The Sun Java Workstation W2100z can reach up to a maximum of 16 GB memory.

Both workstations support industry-standard registered ECC PC3200 DIMMs in 512-MB, 1-GB, and 2-GB configurations.

All DIMMs are available in pairs from Sun and should be installed in identical pairs. Sockets 1,2 3,4 (CPU1) and 5,6 7,8 (CPU2) are the pairs and must contain identical DIMMs (same size, rank, and speed). If they are not, the memory controller may be placed in single channel mode vs dual channel mode and memory performance will suffer significantly. Performance degradation will vary depending on the application(s) running.

External Connectivity Ports

The Sun Java Workstation W1100z and W2100z contain several expansion and peripheral connectivity ports, as shown in Table 3-1. All ports are located either in the front or the back, providing easy access to peripherals, connectors, and visual indicators. Figures 2-1 and 2-2 show the location of each port.

Table 3-1: Sun Java Workstation W1100z and W2100z I/O Ports

Port Type	Front	Back
USB 2.0	2	3
FireWire (IEEE 1394a)	1	1
Gigabit Ethernet	0	1
Audio	2	3
Parallel	0	1
Serial	0	2

Expansion Bays

The Sun Java Workstation W1100z and W2100z each have six expansion bays: two external and four internal. The first external bay is always occupied by the DVD-ROM/CD-RW drive. Table 3-2 describes the different expansion bays.

NOTE: The Sun Java Workstation W1100z and W2100z will initially support only two internal hard drives. Up to four internal hard drives will be supported by August 2004.

Table 3-2: Sun Java Workstation W1100z and W2100z Expansion Bays

Bay	Type	Description
Bay 1	External	Occupied with DVD-ROM/CD-RW drive
Bay 2	External	Open bay for DVD +/- R/RW drive
Bay 3	Internal	Open bay for HDD
Bay 4	Internal	Open bay for HDD
Bay 5	Internal	Open bay for HDD
Bay 6	Internal	Open bay for HDD

The Sun Java Workstation W1100z is available in standard configuration with UltraATA-100 drives only and the option to add one more UltraATA drive for a maximum of two drives. The Sun Java Workstation W1100z is not available with SCSI storage from the factory. The addition of an appropriately terminated Ultra320 SCSI cable to the Sun Java Workstation W1100z to Sun-recommended SCSI drives can be performed by Sun Professional Services. Details are available from Sun or a Sun authorized reseller. Additional SCSI storage options are available via PCI-X expansion cards.

The Sun Java Workstation W2100z is available in standard configuration with Ultra320 SCSI drives only and the option to add one more Ultra320 drive for a maximum of two drives. The Sun Java Workstation W2100z is not available with UltraATA in a standard configuration. As mentioned above, a Sun representative or Sun authorized reseller should be consulted for custom storage options and configurations.

Expansion Slots

The Sun Java Workstation W1100z and W2100z each have six expansion slots:

- One AGP 8x slot
- One PCI-X slot operating at 133 MHz
- Four PCI-X slots operating at 100 MHz

The AGP slot is always occupied by an AGP graphics card. No other cards should ever be inserted into the AGP slot. The Sun Java Workstation W1100z and W2100z are not available without a graphics card. PCI-X slots can be used for optional cards such as Gigabit Ethernet, Ultra320 SCSI Adapter. Table 3-3 explains the layout of the expansion slots.

Table 3-3: Sun Java Workstation W1100z/W2100z Expansion Slot Layout

Slot	Type	Color	Description
Slot 1	PCI-X 100MHz 64 bit	White	Open slot (nearest to power supply)
Slot 2	PCI X 133MHz 64-bit	Black	Open slot
Slot 3	PCI X 100MHz 64-bit	Green	Open slot
AGP	AGP 8x	Brown	Occupied by graphics card
Slot 4	PCI-X 100MHz 64 bit	White	Open slot
Slot 5	PCI-X 100MHz 64 bit	White	Open slot (farthest from power supply)

Chapter 4

Sun Java Workstation W1100z and W2100z Graphics Accelerators

Customers familiar with Sun workstations will also be familiar with Sun's consistency in delivering outstanding graphics performance at cost-effective thresholds. In the infancy of the performance workstation market, graphics accelerators were typically provided by the workstation vendor. By 2004, the computer graphics industry has fully matured with well-established first, second, and third tiers of commodity graphics hardware vendors who have revolutionized the entire market with commodity pricing and virtual-reality-level performance. Sun is excited to be leveraging the very best of the first tier vendors, featuring nVidia graphics accelerators across the initial lineup.

The Sun Java Workstation W1100z and W2100z are well-suited for compute-intensive and visualization applications in oil and gas, bio-sciences, EDA (electronic design automation), and MCAE (mechanical computer-aided engineering). Therefore, a variety of graphic cards are available, allowing customers to maximize the functionality of their system(s) relating to the chosen application.

The following graphics accelerator cards are available from Sun:
- NVIDIA Quadro NVS280
- NVIDIA Quadro FX500
- NVIDIA Quadro FX3000
- NVIDIA Quadro FX4000

NOTE: Because all cards are AGP-based and there is only a single AGP slot in both systems, the first release of the Sun Java Workstation W1100z and W2100z will support only one graphics accelerator card at a time. However, each of these cards supports multi-headed operation, depending on specific features in the operating and windowing system of choice.

NVIDIA Quadro NVS280

The NVIDIA Quadro NVS280 Graphics Accelerator is a professional 2-D graphics card with dual-display capabilities. The NVIDIA Quadro NVS280 screen resolutions and refresh rates are listed in Table 4-1. More information about the NVIDIA Quadro NVS280 Graphics Accelerator can be found at http://www.nvidia.com/page/quadronvs.html.

The Quadro NVS280 includes the following features:
• 64 MB of 200MHz DDR SDRAM
• Dual 350-MHz integrated RAMDACs
• Maximum power of 13W
• Dual ™DS transmitters
• AGP8x support with fast writes
• Single, high-density 60-pin LFH video connector to support dual analog or digital displays (need supplied
splitter cable to support dual displays)
• Drivers for easy installation and manageability

NOTE: 3-D OpenGL rendering is supported only in software on this entry-level card.

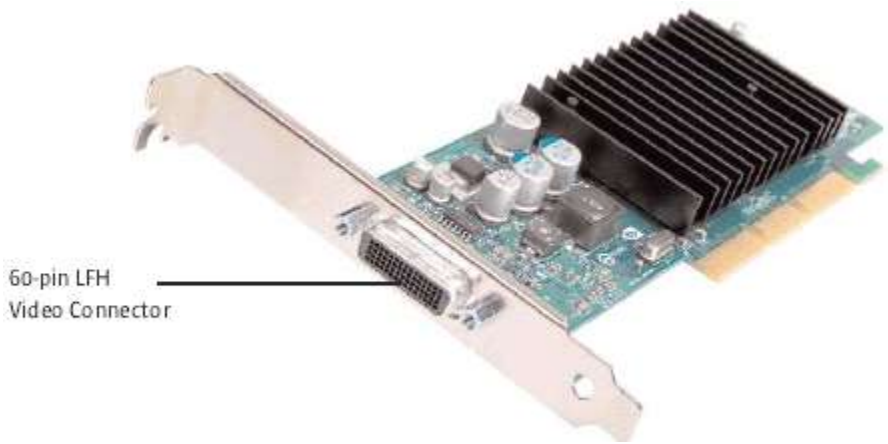

Figure 4-1. NVIDIA Quadro NVS280 Graphics Accelerator

Table 4-1: NVIDIA Quadro NVS280 Screen Resolutions and Refresh Rates

Resolution	Color Bits	Refresh Rate (Hz)
320 x 200	8, 16, 32	60, 70, 75
320 x 240	8, 16, 32	60, 70, 75
400 x 300	8, 16, 32	60, 70, 75
480 x 360	8, 16, 32	60, 70, 75
512 x 384	8, 16, 32	60, 70, 75
640 x 400	8, 16, 32	60, 70, 72, 75, 85, 100, 120
640 x 480	8, 16, 32	60, 70, 75, 85, 100, 120
800 x 600	8, 16, 32	60, 70, 72, 75, 85, 100, 120
1024 x 768	8, 16, 32	60, 70, 72, 75, 85, 100, 120
1152 x 864	8, 16, 32	60, 70, 72, 75, 85, 100, 120
1280 x 960	8, 16, 32	60, 70, 75, 85, 100, 120
1280 x 1024	8, 16, 32	60, 70, 72, 75, 85, 100, 120
1600 x 900	8, 16	60, 70, 75, 85, 100
1600 x 900	32	60, 70, 75, 85
1600 x 1200	8, 16	60, 70, 72, 75, 85, 100, 120
1600 x 1200	32	60, 70, 72, 75, 85, 100
1792 x 1344	8, 16, 32	60, 75
1856 x 1392	8, 16, 32	60, 75
1920 x 1080	8, 16	60, 70, 72, 75, 85, 100
1920 x 1080	32	60, 70, 72, 75, 85
1920 x 1200	8, 16	60, 70, 72, 75, 85, 100
1920 x 1200	32	60, 70, 72, 75, 85
1920 x 1440	8, 16	60, 70, 72, 75, 85
1920 x 1440	32	60, 70, 72, 75
2048 x 1536	8, 16	60, 70, 72, 75
2048 x 1536	32	60

NVIDIA Quadro FX500

The NVIDIA Quadro FX500 Graphics Accelerator is a professional, entry-level 3-D graphics card with dual-display capabilities. The NVIDIA Quadro FX500 screen resolutions and refresh rates are listed in Table 4-2. More information about the NVIDIA Quadro FX500 Graphics Accelerator can be found at http://www.nvidia.com/page/quadrofx_family.html.

The Quadro FX500 includes the following features:

- 128 MB of 128-bit DDR SDRAM
- Dual 270-MHz integrated RAMDACs
- Maximum power of 11.6W
- Dual ™DS transmitters
- AGP8x support with fast writes
- DVI-I and VGA connectors to support dual analog or digital displays (a DV-I to HD15 VGA connector is supplied to support dual analog displays)
- Drivers for easy installation and manageability

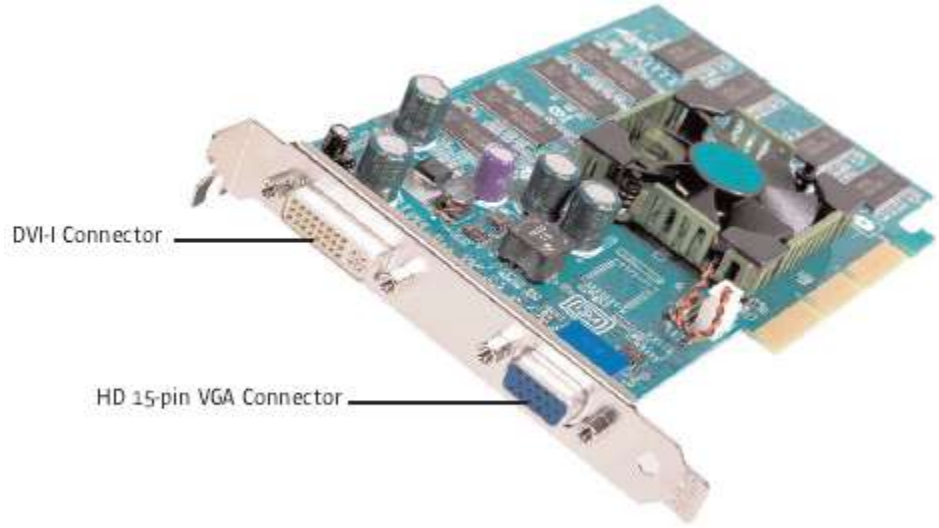

Figure4-2. NVIDIA Quadro FX500 Graphics Accelerator

Table 4-2: NVIDIA Quadro FX500 Screen Resolutions and Refresh Rates

Resolution	**Color Bits**	**Refresh Rate (Hz)**
320 x 200	8, 16, 32	60, 70, 75
320 x 240	8, 16, 32	60, 70, 75
400 x 300	8, 16, 32	60, 70, 75
480 x 360	8, 16, 32	60, 70, 75
512 x 384	8, 16, 32	60, 70, 75
640 x 400	8, 16, 32	60, 70, 72, 75, 85, 100, 120
640 x 480	8, 16, 32	60, 70, 75, 85, 100, 120
800 x 600	8, 16, 32	60, 70, 72, 75, 85, 100, 120
1024 x 768	8, 16, 32	60, 70, 72, 75, 85, 100, 120
1152 x 864	8, 16, 32	60, 70, 72, 75, 85, 100, 120
1280 x 960	8, 16, 32	60, 70, 75, 85, 100, 120
1280 x 1024	8, 16, 32	60, 70, 72, 75, 85, 100, 120
1600 x 900	8, 16	60, 70, 75, 85, 100
1600 x 900	32	60, 70, 75, 85
1600 x 1200	8, 16	60, 70, 72, 75, 85, 100, 120
1600 x 1200	32	60, 70, 72, 75, 85, 100
1792 x 1344	8, 16, 32	60, 75
1856 x 1392	8, 16, 32	60, 75
1920 x 1080	8, 16	60, 70, 72, 75, 85, 100
1920 x 1080	32	60, 70, 72, 75, 85
1920 x 1200	8, 16	60, 70, 72, 75, 85, 100
1920 x 1200	32	60, 70, 72, 75, 85
1920 x 1440	8, 16	60, 70, 72, 75, 85
1920 x 1440	32	60, 70, 72, 75
2048 x 1536	8, 16	60, 70, 72, 75
2048 x 1536	32	60

NVIDIA Quadro FX3000

The NVIDIA Quadro FX3000 Graphics Accelerator is a high-end 3-D graphics card with dual-display capability. The NVIDIA Quadro FX3000 screen resolutions and refresh rates are listed in Table 4-4. More information about the NVIDIA Quadro FX3000 Graphics Accelerator can be found at http://www.nvidia.com/page/quadrofx_family.html.

The Quadro FX3000 includes the following features :

- 256MB of 256-bit DDR SDRAM
- Dual 400-MHz integrated RAMDACs
- Maximum power of 67W
- 12 programmable shader units
- 12-bit subpixel precision
- Hardware-accelerated 16x full-scene anti-aliasing (FSAA)
- 2 DVI-I connectors + Stereo to support dual digital displays
- 2 DVI-I to HD15 VGA adapters to support dual analog displays
- AGP 8x support with fast writes
- Drivers for easy installation and manageability

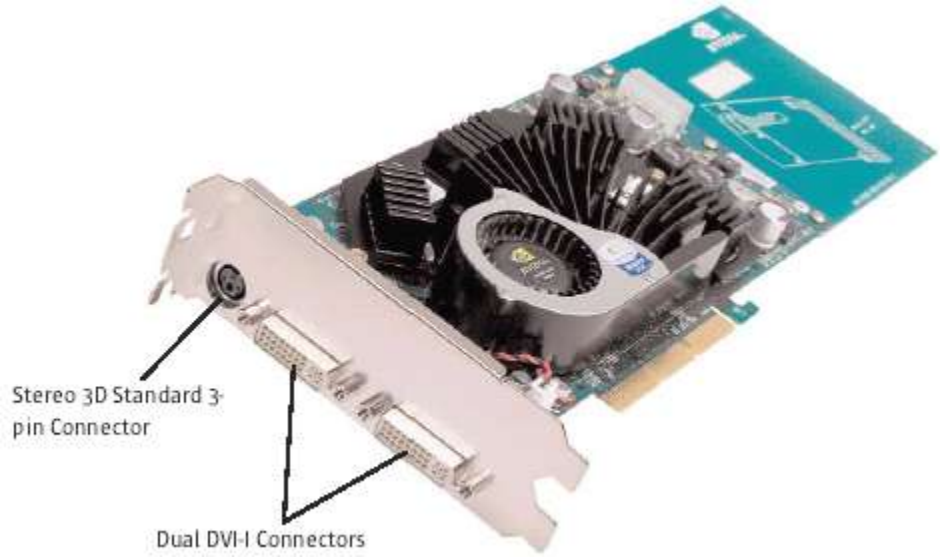

Figure 4-3. NVIDIA Quadro FX3000 Graphics Accelerator

Table 4-3: NVIDIA Quadro FX3000 Screen Resolutions and Refresh Rates

Resolution	Color Bits	Refresh Rate (Hz)
320 x 200	8, 16, 32	60, 70, 75
320 x 240	8, 16, 32	60, 70, 75
400 x 300	8, 16, 32	60, 70, 75
480 x 360	8, 16, 32	60, 70, 75
512 x 384	8, 16, 32	60, 70, 75
640 x 400	8, 16, 32	60, 70, 72, 75, 85, 100, 120
640 x 480	8, 16, 32	60, 70, 75, 85, 100, 120
800 x 600	8, 16, 32	60, 70, 72, 75, 85, 100, 120

Resolution	Color Bits	Refresh Rate (Hz)
1024 x 768	8, 16, 32	60, 70, 72, 75, 85, 100, 120
1152 x 864	8, 16, 32	60, 70, 72, 75, 85, 100, 120
1280 x 720	8, 16, 32	60, 70, 72, 75, 85, 100, 120
1280 x 960	8, 16, 32	60, 70, 75, 85, 100, 120
1280 x 1024	8, 16, 32	60, 70, 72, 75, 85, 100, 120
1600 x 900	8, 16, 32	60, 70, 75, 85, 100
1600 x 1200	8, 16	60, 70, 72, 75, 85, 100
1792 x 1344	8, 16, 32	60, 75
1856 x 1392	8, 16, 32	60, 75
1920 x 1080	8, 16	60, 70, 72, 75, 85, 100
1920 x 1080	32	60, 70, 72, 75, 85
1920 x 1200	8, 16	60, 70, 72, 75, 85, 100
1920 x 1200	32	60, 70, 72, 75, 85
1920 x 1440	8, 16, 32	60, 70, 72, 75, 85
2048 x 1536	8, 16, 32	60, 70, 72, 75
3840 x 2400	8, 16, 32	13, 20, 24, 25

NVIDIA Quadro FX4000

The NVIDIA Quadro FX4000 Graphics Accelerator is an ultra high-end 3-D graphics card with dual-display capability. The S Sun Java Workstations W1100z/ W2100z support only one NVIDIA Quadro FX4000 graphics accelerator card at a time. The Quadro FX4000 includes:

- 256MB of 256-bit DDR SDRAM
- Dual 400-MHz integrated RAMDACs
- Maximum power of 110W
- 12 programmable shader units
- 12-bit subpixel precision
- Hardware-accelerated 16x full-scene anti-aliasing (FSAA)
- 2 DVI-I connectors + Stereo
- AGP8x support with fast writes
- Quality drivers for easy installation and manageability

Resolution	Color Bits	Refresh Rate (Hz)
320 x 200	8, 16, 32	60, 70, 75
320 x 240	8, 16, 32	60, 70, 75
400 x 300	8, 16, 32	60, 70, 75
480 x 360	8, 16, 32	60, 70, 75
512 x 384	8, 16, 32	60, 70, 75
640 x 400	8, 16, 32	60, 70, 72, 75, 85, 100, 120
640 x 480	8, 16, 32	60, 70, 75, 85, 100, 120
800 x 600	8, 16, 32	60, 70, 72, 75, 85, 100, 120

Resolution	Color Bits	Refresh Rate (Hz)
1024 x 768	8, 16, 32	60, 70, 72, 75, 85, 100, 120
1152 x 864	8, 16, 32	60, 70, 72, 75, 85, 100, 120
1280 x 720	8, 16, 32	60, 70, 72, 75, 85, 100, 120
1280 x 960	8, 16, 32	60, 70, 75, 85, 100, 120
1280 x 1024	8, 16, 32	60, 70, 72, 75, 85, 100, 120
1600 x 900	8, 16, 32	60, 70, 75, 85, 100
1600 x 1200	8, 16	60, 70, 72, 75, 85, 100
1792 x 1344	8, 16, 32	60, 75
1856 x 1392	8, 16, 32	60, 75
1920 x 1080	8, 16	60, 70, 72, 75, 85, 100
1920 x 1080	32	60, 70, 72, 75, 85
1920 x 1200	8, 16	60, 70, 72, 75, 85, 100
1920 x 1200	32	60, 70, 72, 75, 85
1920 x 1440	8, 16, 32	60, 70, 72, 75, 85
2048 x 1536	8, 16, 32	60, 70, 72, 75, 85
3840 x 2400	8, 16, 32	13, 20, 24, 25

Chapter 5

Sun Java Workstation W1100z and W2100z Environmentals and Regulations

This chapter outlines the environmental and regulation specifications for the Sun Java Workstation W1100z and W2100z.

Environment

The Sun Java Workstation W1100z and W2100z meet or exceed the environmental specifications listed in Table 5-1.

Table 5-1: Sun Java Workstation W1100z and W2100z Environmental Specifications

	Sun Java Workstation W1100z/W2100z
AC Power	100-120; 220-240 V AC, 47–63 Hz, typical 2 CPU config 0.39 KVA; Maximum 0.875 KVA
Operating	5° C to 35° C (41° F to 95° F); 20% to 93% relative humidity, non-condensing
Non-operating	-40° C to 65° C (-40° F to 149° F) at sea level; 93% relative humidity, non-condensing 38° C maximum wet bulb
Operating Acoustic Noise	5.1 bels
Idling Acoustic Noise	5.0 bels

Regulations

The Sun Java Workstation W1100z and W2100z meet or exceed the following regulatory specifications listed in Table 5-2.

Table 5-2: Sun Java Workstation W1100z and W2100z Regulatory Specifications

	Sun Java Workstation W1100z/W2100z
Safety	UL/CSA-60950, EN 60950, IEC 60950 CB
Ergonomics	EK1-1TB-2000
RFI/EMC	EN 55022/CISPR22 Class B, FCC CFR47 Part 15 Class B; EN 61000-3-2, EN 61000-3-3; EN 300-386 v1.3.1
Immunity	EN 55024
Regulatory Markings	UL/cUL, TUV-GS, CE FCC, ICES-003, C-Ticek, VCCI, GOST-R, BSMI, MIC, CCC (pending), S-Mark
Power Management	Energy Star (E-Star) support will be provided in future Solaris™ OS releases

Chapter 6

Software Operating Environment(s)

The 64-bit Sun Java Workstation W1100z and W2100z offer the greatest range in Sun history of operating systems support, more than other workstations offered by Sun's competitors. The Sun Java Workstation W1100z/W2100z support multiple 32-bit and 64-bit operating systems, including Linux and Solaris. The Sun Java Workstation W2100z is also Windows XP Professional WHQL (Windows Hardware Qualification Lab) certified. Table 6-1 lists the different operating systems supported on the Sun Java Workstation W1100z/W2100z.

Table 6-1: Supported Operating Systems

Operating System		**Available through Sun**
Solaris 10 Update 7	64bit	Yes
SuSE Linux Enterprise Server 9 (AMD64)	64-bit	Yes
Solaris 9 U6 HW 04/04 x86 OS Platform Edition	32-bit	Yes
Solaris Future x86 Platform Edition	64-bit	Yes
MS Windows XP Professional	32-bit	No**
MS Windows XP 64-bit Extended	64-bit	No**
Red Hat Enterprise Linux 3.0 WS v3 - x86	32-bit	Yes
Red Hat Enterprise Linux 3.0 WS v3 - x86	64bit	Yes

Red Hat Enterprise Linux 3.0 WS v3 - x86, Red Hat Enterprise Linux 3.0 WS v3 - AMD64, and Solaris 9 U6 HW 04/04 x86 operating systems can be ordered from Sun. Support contracts are also available for these operating systems.

** The Sun Java Workstation W2100z has been qualified by the Microsoft Hardware Quality Labs (WHQL) and has earned the "Compatible with Windows" designation as a certified platform to run the Microsoft Windows XP Professional Operating system. The Sun Java Workstation W2100z will be listed on the Microsoft Hardware Compatibility List (HCL) which can be seen by visiting the Microsoft Windows Hardware and Driver Central (WHDC) Web site at http://www.microsoft.com/windows/catalog/default.aspx?subID=22&xslt=search &qu=w2100z&scope=1&btnSearch=Go. While the Sun Java Workstation W2100z is qualified to run the Microsoft Windows XP 32- and 64-bit Professional operating systems listed above, these operating

systems are available only from Microsoft or a Microsoft certified partner.

Solaris™ Operating System

The Solaris OS is designed to deliver the power, flexibility, availability, and compatibility to support enterprise-wide computing. It combines key computing elements such as operating system and networking and user environments into a stable, high-quality foundation that organizations can depend on to develop, deliver, and manage business- and mission-critical computing solutions. The strengths of the Solaris OS lie in its enterprise-class reliability, scalability, and performance. Organizations supplying services on demand will appreciate key functionality that aids in the constant and consistent delivery of applications and services to their customers.

NOTE: All occurrences of Solaris 9 OS for the Sun Java Workstation W1100z and W2100z refer specifically to Solaris 9 U6 HW 04/04 x86 OS.

Solaris 9 U6 HW 04/04 x86 OS is the minimum required release for the Sun Java Workstation W1100z and W2100z. The Solaris 9 x86 OS on the Sun Java Workstation W1100z and W2100z supports 32-bit applications only. The impending release of Solaris 10 OS x86 Platform Edition in early 2005 will deliver both 32-bit and 64-bit support. The Solaris Operating System delivers several critical performance and reliability features, such as:

- Enhanced ease of use and PC-interoperability features
- Integrated, high-performance Java™ technology and tools
- Robust software developer environment
- Advanced, standards-based networking
- Improved systems installation and management tools
- Enterprise-class directory services
- Enhanced desktop tools, I/O standards, and security

Other key features include:

- 100% binary compatibility
- Reliability, availability, and serviceability
- Java 2 SDK
- IPv6/IPsec/Mobile IP
- LDAP directory services
- System management tools
- Desktop management and productivity tools
- Extended device and support
- Internationalization
- X11R6.4 support
- Real-time application support
- Enhanced security features

Solaris™ 9 Operating System Specific Features

The Solaris OS continues the tradition of the Reliability, Availability, and Scalability (RAS) of earlier operating environment releases, including features such as IPv6/IPsec/Mobile IP, real-time application support, file system logging, and remote console.

Existing applications that adhere to the Solaris x86 OS application binary interface (ABI) and that are compiled with the same APIs, will run unmodified on x86 platforms. In addition, Sun provides an easy-to-use AppCert testing tool for developers to verify existing Solaris OS application binaries and report any potential incompatibilities.

Productivity Features

Solaris 9 OS software offers enhanced diagnostic capabilities, availability, scalability, performance, Java technology, and graphics. With the Solaris OS, an organization receives a full suite of integrated tools for browsing, collaborating, and interoperating with PCs. The Solaris 9 x86 OS provides a stable, high-performance, 32-bit platform with customizable workspaces, graphical system monitoring, and business/office productivity tools (including the StarOffice™ 7.0 productivity suite).

Advanced Networking

Support for IPv6 in the Solaris OS is integrated into NFS, RPC, NIS, NIS+, and DNS. IPsec enables secure virtual private networks and network access control. Mobile IP provides Internet disconnect/reconnect capabilities with no data loss.

Bundled Software

Software bundled with the Solaris OS includes Oracle 8i Enterprise Edition, lxrun for Linux application compatibility (for the Solaris OS [x86 Platform Edition]), Apache Web Server, Netscape Communicator, Sun Java™ System Directory Server, gzip, bash, and tcsh.

The Solaris operating environment ships with support for a number of software components that increase overall availability, including Solaris Resource Manager software for fine-grained control of system resources, Solaris™ Bandwidth Manager software for enhanced network resource availability, and Sun™ Cluster 3.0 software for even greater application availability through a clustered file system, scalable data services, and built-in load balancing.

Solaris 9 OS Bundled Desktop Environments

Common Desktop Environment (CDE) Enhancements

The latest generation of the Common Desktop Environment (CDE) comes standard, providing workstation users with an easy-to-use, open, secure platform. Personal Digital Assistant (PDA) support synchronizes data from most Palm computing devices with the CDE calendar, mail, memo, and address book. CDE now features streaming video using MPEG1, MPEG2, Quicktime, and AVI formats, as well as MIDI audio using Java™ Media Framework technology.

GNOME 2.0 Desktop Environment

GNOME 2.0, the modern desktop for the Solaris 9 Operating System (OS), provides applications and tools that are designed to enhance the productivity of your business in a networked world. GNOME 2.0 helps organizations achieve their business goals by offering a unified, modern, accessible, open, networked, and cost-effective desktop solution. Key features of GNOME 2.0 include:

- Personalization capabilities that allow users to change settings to suit their preferences
- Built-in accessible applications and assistive technology solutions for users with disabilities
- Removes complexity of supporting disparate desktop user environments and focuses on a richer

common unified desktop
• Open file standards provide transparent file and data interchange
• Built-in accessibility support enables all users to interact with the GNOME 2.0 desktop environment running on any UNIX platform
• Flexibility and choice to run GNOME, CDE/Motif, and Java technology-based applications unmodified, preserving existing software investments
• Support for key open standards to facilitate interoperability, compatibility, and collaboration in today's highly-networked, heterogeneous world, including support for XML, DOM, HTTP, HTML, CORBA, MIME, Unicode, MPEG, JPEG, AVI, MIDI, XDnD (drag & drop), X11, NFS, and TCP/IP

GNOME 2.0 for the Solaris OS is open source, free software with no upgrade or licensing fees. It is targeted as the alternative desktop to CDE in the Solaris 9 OS. More information about GNOME 2.0 is available at http://www.sun.com/gnome.

File System Logging

Logging file system features and parallel SCSI probes make rebooting faster. The Solaris 9 OS delivers the performance and stability you need to meet your production, database, and file system requirements with no incremental costs. UFS (User File System) logging enhancements deliver up to 140% better performance than Veritas. UFS Direct I/O enhancements provide an 87% database performance improvement over default UFS.

Solaris JumpStart™ Software

With potentially hundreds or thousands of systems to manage, automation is absolutely key. Reducing TCO depends on enabling a small administrative staff to manage a large number of systems. The Solaris OS provides many of the key elements that enable efficient, centralized administration and automation. For example, administrators can boot Sun workstations remotely over the network and install operating systems from remote system administration servers. A standard component of the Solaris OS, Solaris JumpStart software enables fully automatic and remote operating system installation based on custom profiles and scripts.

Solaris™ Flash Software

To improve utilization of the systems that make up today's data centers, administrators are turning to tools such as Solaris™ Flash software. Solaris Flash software provides new provisioning functionality that allows administrators to capture a snapshot image of a complete system—including the Solaris OS, the applications stack, and the system configuration into a new Flash Archive format. Using this system image, administrators can then rapidly replicate a reference system configuration onto many target systems. Solaris Flash images can be deployed via standard media or over the network via HTTP and NFS protocols. Solaris Flash software images can be installed using custom Solaris JumpStart software scripts, the Solaris™ Web Start software graphical interface, or through interactive installation of the Solaris Operating System.

Solaris™ Live Upgrade Software

Solaris™ Live Upgrade software allows Solaris OS software to be installed on a separate partition from the currently running version of the operating environment. In particular, Solaris Live Upgrade software enables systems to run uninterrupted while a system administrator installs a Solaris™ Flash archive or upgrades to a new version of the Solaris Operating System. As a result, downtime for upgrades is reduced to the time needed for a reboot. When installation is complete, a simple reboot enables the Solaris 9 OS to take control. Since Solaris Live Upgrade software includes a version migration and fallback feature, organizations can also fall back to the previous release (again, through a simple reboot) without losing administration information.

Real-Time Video Creation and Broadcast Support

A Java Media Framework (JMF) technology player provides access to the latest industry-standard audio and video files, including MPEG1/2, QuickTime, VIVO, AVI, AIFF, GSM, WAV, RMF, AU, and MIDI.

Graphics Software Interfaces

The Sun Java Workstation W1100z and W2100z has limited support for any Solaris OS graphics APIs, and window system APIs. A large number of Sun and third-party graphics APIs will be supported, including Java 3D software in future Solaris x86 OS releases. Industry-standard X-extension libraries, such as Xlib, are available now. Figure 6-1 shows a block diagram of the graphics and window system API support on the Sun Java Workstation W1100z and W2100z.

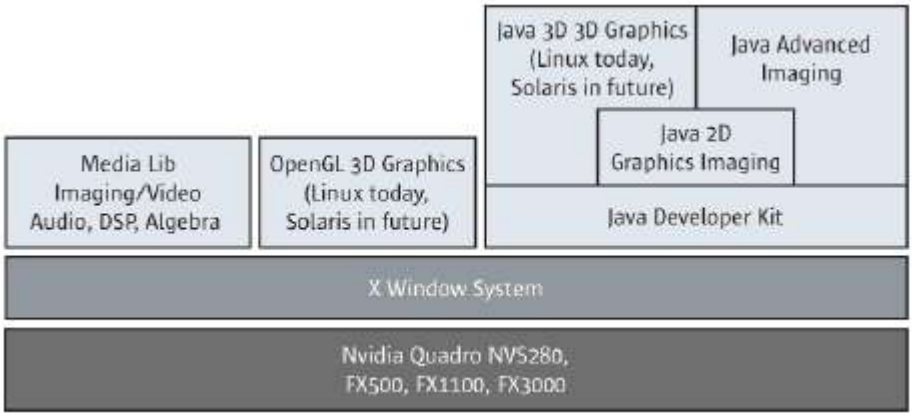
Java 3D 3D Graphics (Linux today, Solaris in future)
Java Advanced Imaging
Java 2D Graphics Imaging
Media Lib Imaging/Video Audio, DSP, Algebra
OpenGL 3D Graphics (Linux today, Solaris in future)
Java Developer Kit
X Window System
Nvidia Quadro NVS280, FX500, FX1100, FX3000

Figure 6-1. Block diagram of graphics and window system API support on the Sun Java Workstation W1100z and Sun Java Workstation W2100z

Solaris OS Licensing and Usage

Under the Free Solaris™ Binary License Program program, Sun is making the binary (runtime) version of its Solaris 9 OS available to anyone who accepts the terms of the Solaris OS Binary Code License (BCL) and the Free Solaris Binary License Program. There are no fees for the right to use the software on computers with a capacity of eight or fewer processors. There is a small charge for the media kit.

Refer to http://www.sun.com/software/solaris for current licensing details. Features of the Solaris OS license include the following:

- No distinction between desktop and server licenses
- Free binary (runtime) license for all systems with eight or fewer CPUs for users who accept the terms of the Solaris 9 OS Binary Code License and the Free Solaris Binary License Program
- Solaris 9 OS software is provided via the Solaris™ 9 Media Kit available for purchase at http://www.sun.com/ solaris/binaries
- Single Solaris™ Media Kit for installing multiple systems
- Solaris Media Kit contains additional bundled software
- Solaris Supplemental CD of bundled user and system management tools
- Oracle 8i Enterprise Edition (with development license)
- StarOffice 6.0 productivity suite
- Solaris™ Software Companion CD of popular freeware

Chapter 7
Additional Software Tools

Sun N1™ Grid Engine Software Environment

Whatever the business, it makes good economic sense to maximize utilization by using a customer's existing IT infrastructure to raise productivity, maintain availability, and minimize downtime. Grid computing lets an organization bring together all its heterogeneous resources and allocate them efficiently to applications within the enterprise and beyond. Once all current IT assets are being utilized, organizations can easily add more resources to the grid. The new resources provide seamless expansion of the IT infrastructure; users will only notice the improvement in service.

Companies of all sizes and across many industries have employed grid computing solutions from Sun to solve common business challenges. Benefits include: cost reduction, shorter time to market, and increased quality and innovation.

Sun N1™ Grid Engine software is a distributed resource management (DRM) product that optimizes utilization of software and hardware resources. Grid Engine software finds a pool of idle resources and harnesses it productively, so an organization gets as much as five to ten times the usable power out of systems on the network. This powerful software can help increase utilization to as much as 98%. Sun N1 Grid Engine software aggregates available compute resources (workstations or servers) and delivers compute power as a network service.

In addition, the Sun N1 Grid Engine, Enterprise Edition software enables managers to assign total computing resources over specified periods of time (weeks, months, quarters) to each product, project, design team, and user. This ability enables management to plan compute resource usage over specific time intervals to achieve an organization's business and strategic goals. Sun grid computing solutions are ideal for compute-intensive industries such as scientific research, EDA, life sciences, MCAE, geological sciences, and financial services.

Java™ Desktop System (JDS) Software

The award-winning Java Desktop System, Release 2 combines the best of open source software with the technical
innovation of Sun to deliver an affordable, comprehensive, fully integrated desktop client environment

with
administration and developer tools and enterprise-ready support. This offering lowers business costs, reduces
complexities of desktop management, and provides a secure computing environment.

The desktop components are based on open source and standards and include the GNOME desktop environment, StarOffice productivity suite, Mozilla™ browser, Evolution mail and calendar client, and Java 2 Platform Standard Edition. Java Desktop System is the only desktop solution which includes, without additional cost, server-side administration tools that enable centralized configuration, deployment, and administration of the user desktop environment. In addition, Java Desktop System includes advanced developer tools to assist developers in creating Java-technology-based applications for the desktop.

Future releases of Java Desktop System are planned to support workstations and Sun Ray™ thin clients running the Solaris Operating System.

Java Desktop System, is available in a single and multi user product package. The single user package include the following desktop and developer software. The multi user package includes desktop, developer and system management software.

Major components of the software are:
• Desktop Software
• GNOME 2.2 Desktop
• StarOffice 7 Productivity Suite
• Mozilla™ 1.4 Web browser
• Java System Update Services for online patch retrieval and installation
• Java 2 Platform, Standard Edition, 1.4.2 (with support for GNOME look & feel)
• Linux OS (based on SuSE SLD 1.0)

Developer Tools provided as a BONUS with purchase:
• Sun Java Studio Standard 5 update 1 Technology Preview
• NetBeans IDE 3.6
• Java 2 Platform, Standard Edition (J2SE)1.4.2_04 which includes the SDK

System Management Tools (available only with the multi-user products):
• Sun Control Station 2.1 for centralized desktop deployment and management.
• Java Desktop System Configuration Manager, Release 1 for policy-based desktop administration
• Remote Desktop Takeover

Since Java Desktop System, Release 2 includes the developer tools as a bonus, there is a separate license for the developer tools.

The Java Desktop System, Release 2 license to use the desktop client and system management software is perpetual. The entitlement to get patches and upgrades is based on the annual license.

The Developer software including Net Beans™, Sun Java Studio Technology Preview and JD2SE software license is perpetual usage of software but does not include access to patches or upgrades.

The Java Desktop System home page is located at: http://www.sun.com/software/javadesktopsystem/

Sun Studio 8 Software for x86

Sun Studio 8 software provides corporate developers and ISVs with a comprehensive, integrated suite

of tools for the development and deployment of enterprise applications on Sun platforms. Further, it delivers reliable, scalable, high performance applications for the Solaris Operating System. Sun Studio 8 delivers an integrated set of tools for the developer targeting Sun platforms—primarily via native (C, C++, FORTRAN) binaries—with support for work that combines native code and Java. Sun Studio 8 software is a major update from Sun ONE Studio 7, Enterprise Edition software.

Sun Java™ Studio Software

Sun Java Studio software is a comprehensive, integrated offering that improves developer productivity with intuitive, easy-to-use tools and technologies.

Java Studio software consists of tools, software development kits (SDKs), application programming interfaces (APIs) and libraries, and developer services. Using Java Studio software, developers can rapidly develop applications and Web services across multiple platforms and environments.

Sun Java™ Studio Enterprise Software

Java Studio Enterprise software is a complete, cost-effective, unified platform of tools, support, and services designed to fully integrate with the capabilities of the Sun Java Enterprise System. Java Studio Enterprise software enables the development of applications in an environment carefully designed to improve productivity while simplifying the creation of sophisticated network applications ready to be deployed on the Java Enterprise System.

Sun Java™ Studio Creator Software

The Sun Java Studio Creator environment is the next-generation tool for Java application development. This effort brings together the power of 100% Java standards with a simplified visual development model recognized by many developers as the most effective, most productive way to work.

The Java Studio Creator environment is designed to address the needs of skilled developers whose primary, day-to-day concern is how to rapidly deliver business-critical applications. It enables developers to leverage the power of the Java platform to solve business problems, without getting bogged down in plumbing, and without giving up the highly productive visual development they are used to.

Sun has always focused on making Java technologies robust. The Java Studio Creator development environment demonstrates a new direction: highly robust, powerful technologies that can be used productively and effectively. With the Java Studio Creator environment, Sun delivers a complete solution for key requirements that customers have increasingly stated are important.

Chapter 8
Conclusion

Today's organizations are facing many challenges. Services must be on-line 24 hours a day and the computing infrastructure must be able to scale both horizontally and vertically without downtime or unnecessary system cost and complexity. Organizations must find ways to provide solutions while reducing cost and complexity.

The Sun Java Workstation W1100z and W2100z are ideal for compute-intensive and visualization applications in oil and gas exploration, life sciences, EDA (electronic design automation), and MCAE (mechanical computer-aided engineering). With a single x86-based architecture, the Sun Java Workstation W1100z and W2100z support both 32-bit and 64-bit operating systems and applications, offering the highest degree of flexibility for customers who want to run existing 32-bit x86 operating systems and applications, and be able to gracefully migrate to the next-generation 64-bit operating systems and applications when they are ready.

References

Sun regularly posts product information in the form of data sheets, specifications, and white papers. Look for these and other Sun technology papers at http://www.sun.com. For documentation on the Sun Java Workstation W1100z and W2100z, as well as all other Sun hardware platforms, visit http://docs.sun.com.

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